

## AMENDMENTS TO THE CLAIMS

1. (Currently amended) A motor driving apparatus for driving a linear vibration motor having a mover which is reciprocatably provided and a spring member which supports the mover, said motor driving apparatus including:

a mover force vibration unit for making the mover freely vibrate;

a vibration parameter obtaining unit for obtaining a natural vibration parameter that shows natural vibration of the mover on the basis of ~~the~~ a free vibration state of the mover;

a spring constant decision unit for ~~deciding~~ calculating a spring constant of the spring member by using the obtained natural vibration parameter obtained by said vibration parameter obtaining unit; and

a mover position calculation unit for calculating the position of the mover on the basis of a driving current and a driving voltage which are applied to the linear vibration motor, by using the spring constant that is decided calculated by the said spring constant decision unit.

2. (Currently amended) The motor driving apparatus as defined in Claim 1, wherein said vibration parameter obtaining unit includes:

a timing detection unit for detecting a timing when the freely vibrating mover passes through a prescribed relative position with respect to a reference position of the vibration; and

a natural frequency detection unit for detecting a natural frequency as the natural vibration parameter of the mover on the basis of an output from ~~the~~ said timing detection unit, and

wherein said spring constant decision unit ~~calculates~~ is operable to calculate the spring constant by multiplying the ~~detected~~ natural frequency detected by said natural frequency detection unit by a twofold of the ratio of the circumference to the diameter ( $\pi$ ), squaring the result of the multiplication, and multiplying the squared value by a mass of the mover.

3. (Currently amended) The motor driving apparatus as defined in Claim 1, wherein said vibration parameter obtaining unit includes:

a timing detection unit for detecting a timing when the freely vibrating mover passes through a prescribed relative position with respect to a reference position of the vibration; and

a natural angular frequency detection unit for detecting a natural angular frequency as the natural vibration parameter of the mover on the basis of an output from ~~the~~said timing detection unit, and

wherein said spring constant decision unit calculates-is operable to calculate the spring constant by squaring the ~~detected~~ natural angular frequency detected by said natural angular frequency detection unit and multiplying the squared natural angular frequency by a mass of the mover.

4. (Currently amended) The motor driving apparatus as defined in Claim 1, wherein said vibration parameter obtaining unit includes:

a timing detection unit for detecting a timing when the freely vibrating mover passes through a prescribed relative position with respect to a reference position of the vibration; and

a natural frequency period detection unit for detecting a natural frequency period as the natural vibration parameter of the mover on the basis of an output from ~~the~~said timing detection unit, and

wherein said spring constant decision unit calculates-is operable to calculate the spring constant by dividing the ~~detected~~ natural frequency period detected by said natural frequency period detection unit by a twofold of the ratio of the circumference to the diameter, squaring the result of the division, multiplying the squared value by an inverse of a mass of the mover, and calculating an inverse of the result of the multiplication.

5. (Currently amended) A motor driving apparatus for driving a linear vibration motor having a mover which is reciprocatably provided and a spring member which supports the mover, said motor driving apparatus including:

a motor driver for applying a driving current and a driving voltage to the linear vibration motor;

a current detection unit for detecting a current that is ~~supplied~~ applied from the said motor driver to the linear vibration motor;

a voltage detection unit for detecting a voltage that is applied from the ~~said~~ motor driver to the linear vibration motor;

a resonance frequency detection unit for detecting a resonance frequency of the linear vibration motor from the detected current and the detected voltage;

a spring constant decision unit for ~~calculating~~ deciding a spring constant of the spring member by multiplying the resonance frequency ~~that is detected by the said~~ resonance frequency detection unit by a twofold of the ratio of the circumference to the diameter, squaring the result of the multiplication, and multiplying the squared value by a mass of the mover; and

a mover position calculation unit for calculating the position of the mover on the basis of the driving current and the driving voltage, by using the spring constant that is decided ~~calculated~~ by the said spring constant decision unit.

6. (Currently amended) The motor driving apparatus as defined in Claim 1, wherein said timing detection unit ~~detects~~ is operable to detect the timing when the freely vibrating mover passes through the prescribed relative position with respect to the reference position of the vibration by using an induced voltage that occurs on a coil of the linear vibration motor due to the free vibration of the mover.

7. (Currently amended) The motor driving apparatus as defined in Claim 1, wherein said mover force vibration unit is operable to mechanically apply ~~applies~~ a force to the mover so that the mover freely vibrates.

8. (Currently amended) The mover driving apparatus as defined in Claim 1, wherein said mover force vibration unit is operable to temporarily cut ~~cuts~~ off the current that is ~~supplied~~ applied to the linear vibration motor so that the mover freely vibrates.

9. (Currently amended) The motor driving apparatus as defined in Claim 1, wherein said mover force vibration unit ~~disconnects~~ is operable to disconnect a load that is connected to the linear vibration motor so that the mover freely vibrates.

10. (Currently amended) The motor driving apparatus as defined in Claim 1, further including: a control unit for setting an operation mode to either a driving mode for driving the linear vibration motor to operate a load that is connected to the linear vibration motor, or an arithmetic mode for calculating the spring constant of the spring member, wherein:

said control unit is operable to temporarily ~~setting~~ set the operation mode to the arithmetic mode before a start of the operation of the load; and

said spring constant calculation unit ~~calculating~~ is operable to calculate the spring constant in the arithmetic mode before the start of the operation of the load; and

said mover position calculation unit ~~calculating~~ is operable to calculate the position of the mover in the driving mode by using the spring constant that has been calculated before the start of the operation of the load.

11. (Currently amended) The motor driving apparatus as defined in Claim 1, further including: a control unit for setting an operation mode to either a driving mode for driving the linear vibration motor to operate a load that is connected to the linear vibration motor, or an arithmetic mode for calculating the spring constant of the spring member, wherein:

said control unit is operable to temporarily ~~setting~~ set the operation mode to the arithmetic mode after a completion of the operation of the load; and

said spring constant calculation unit ~~calculating~~ is operable to calculate the spring constant in the arithmetic mode after the completion of the operation of the load; and

said mover position calculation unit ~~calculating~~ is operable to calculate the position of the mover in the driving mode by using the spring constant that has been calculated in a recently set arithmetic mode.

12. (Currently amended) The motor driving apparatus as defined in Claim 1, further including:

a control unit for setting an operation mode to either a driving mode for driving the linear vibration motor to operate a load that is connected to the linear vibration motor, or an arithmetic mode for calculating the spring constant of the spring member;

a temperature detection unit for detecting a temperature of the linear vibration motor; and

a spring constant estimation unit for estimating the spring constant in a load operating state, wherein:

said control unit is operable to temporarily sets-set the operation mode to the arithmetic mode at least one of before a start of the operation of the load and after a completion of the operation of the load;

said spring constant estimation unit is operable to,

in the arithmetic mode, ~~derives-derive~~ a relationship between the temperature of the linear vibration motor and the spring constant on the basis of the calculated spring constant and the temperature that is detected by ~~the-said~~ temperature detection unit when the spring constant is calculated, and

in the driving mode, ~~estimates-estimate~~ the spring constant in the load operating state on the basis of the temperature detected by ~~the-said~~ temperature detection unit by using the derived relationship between the temperature and the spring constant; and

said mover position calculation unit ~~calculates-is operable to calculate~~ the position of the mover in the driving mode by using the ~~estimated-spring constant~~ estimated by said spring constant estimation unit.

13. (Currently amended) A motor driving apparatus for driving a linear vibration motor having a mover which is reciprocatably provided and a spring member which supports the mover, said motor driving apparatus including:

a mover force vibration unit for making the mover freely vibrate;

a vibration parameter obtaining unit for obtaining a natural vibration parameter that shows natural vibration of the mover on the basis of ~~the~~ a free vibration state of the mover;

a mass/spring ratio decision unit for deciding a mass/spring ratio that is a ratio between a mass of the mover and a spring constant of the spring member by using the obtained-natural vibration parameter obtained by said vibration parameter obtaining unit; and

a mover position calculation unit for calculating the position of the mover on the basis of a driving current and a driving voltage which are applied to the linear vibration motor, by using the mass/spring ratio that is decided by the said mass/spring ratio decision unit.

14. (Currently amended) The motor driving apparatus as defined in Claim 13, wherein said vibration parameter obtaining unit includes:

a timing detection unit for detecting a timing when the freely vibrating mover passes through a prescribed relative position with respect to a reference position of the vibration; and

a natural frequency detection unit for detecting a natural frequency as the natural vibration parameter of the mover on the basis of an output from ~~the~~ said timing detection unit, and

wherein said mass/spring ratio decision unit decides-is operable to decide the mass/spring ratio by multiplying the detected-natural frequency detected by said natural frequency detection unit by a twofold of the ratio of the circumference to the diameter ( $\pi$ ), squaring the result of the multiplication, and calculating an inverse of the squared value.

15. (Currently amended) The motor driving apparatus as defined in Claim 13 wherein said vibration parameter obtaining unit includes:

a timing detection unit for detecting a timing when the freely vibrating mover passes through a prescribed relative position with respect to a reference position of the vibration; and

a natural angular frequency detection unit for detecting a natural angular frequency as the natural vibration parameter of the mover on the basis of an output from ~~the~~ said timing detection unit, and

wherein said mass/spring ratio decision unit ~~calculates~~ is operable to calculate the mass/spring ratio by squaring the ~~detected~~ natural angular frequency detected by said natural angular frequency detection unit and calculating an inverse of the squared natural angular frequency.

16. (Currently amended) The motor driving apparatus as defined in Claim 13, wherein said vibration parameter obtaining unit includes:

a timing detection unit for detecting a timing when the freely vibrating mover passes through a prescribed relative position with respect to a reference position of the vibration; and

a natural frequency period detection unit for detecting a natural frequency period as the natural vibration parameter of the mover on the basis of an output from ~~the~~ said timing detection unit, and

wherein said mass/spring ratio decision unit ~~decides~~ is operable to decide the mass/spring ratio by dividing the ~~detected~~ natural frequency period detected by said natural frequency detection unit by a twofold of the ratio of the circumference to the diameter, and squaring the result of the division.

17. (Currently amended) A motor driving apparatus for driving a linear vibration motor having a mover which is reciprocatably provided and a spring member which supports the mover, said motor driving apparatus including:

a motor driver for applying a driving current and a driving voltage to the linear vibration motor;

a current detection unit for detecting a current that is ~~supplied~~ applied from the said motor driver to the linear vibration motor;

a voltage detection unit for detecting a voltage that is applied from ~~the~~ said motor driver to the linear vibration motor;

a resonance frequency detection unit for detecting a resonance frequency of the linear vibration motor from the detected current and the detected voltage;

a mass/spring ratio decision unit for deciding a mass/spring ratio by multiplying the resonance frequency ~~that is detected by the said~~ resonance frequency detection unit by a twofold of the ratio of the circumference to the diameter, squaring the result of the multiplication, and calculating an inverse of the squared value; and

a mover position calculation unit for calculating the position of the mover on the basis of the driving current and the driving voltage, by using the mass/spring ratio that is decided by the said mass/spring ratio decision unit.

18. (Currently amended) The motor driving apparatus as defined in Claim 13, wherein said timing detection unit ~~detects~~ is operable to detect the timing when the freely vibrating mover passes through the prescribed relative position with respect to the reference position of the vibration by using an induced voltage that occurs on a coil of the linear vibration motor due to the free vibration of the mover.

19. (Currently amended) The motor driving apparatus as defined in Claim 13, wherein said mover force vibration unit is operable to mechanically apply ~~applies~~ a force to the mover so that the mover freely vibrates.

20. (Currently amended) The motor driving apparatus as defined in Claim 13, wherein said mover force vibration unit is operable to temporarily cut off ~~cuts cut off~~ the current that is ~~supplied~~ applied to the linear vibration motor so that the mover freely vibrates.

21. (Currently amended) The motor driving apparatus as defined in Claim 13, wherein said mover force vibration unit ~~disconnects~~ is operable to disconnect a load that is connected to the linear vibration motor so that the mover freely vibrates.

22. (Currently amended) The motor driving apparatus as defined in Claim 13, further including a control unit for setting an operation mode to either a driving mode for



driving the linear vibration motor to operate a load that is connected to the linear vibration motor, or an arithmetic mode for calculating the mass/spring ratio, wherein:

said control unit is operable to temporarily setting-set the operation mode to the arithmetic mode before a start of the operation of the load; and

said mass/spring ratio decision unit ~~deciding~~ is operable to decide the mass/spring ratio in the arithmetic mode before the start of the operation of the load; and

said mover position calculation unit ~~calculating~~ is operable to calculate the position of the mover in the driving mode by using the mass/spring ratio that has been calculated before the start of the operation of the load.

23. (Currently amended) The motor driving apparatus as defined in Claim 13, further including: a control unit for setting an operation mode to either a driving mode for driving the linear vibration motor to operate a load that is connected to the linear vibration motor, or an arithmetic mode for calculating the mass/spring ratio, wherein:

said control unit is operable to temporarily setting-set the operation mode to the arithmetic mode after a completion of the operation of the load; and

said mass/spring ratio decision unit ~~deciding~~ is operable to decide the mass/spring ratio in the arithmetic mode after the completion of the operation of the load; and

said mover position calculation unit ~~calculating~~ is operable to calculate the position of the mover in the driving mode by using the mass/spring ratio that has been calculated in a recently set arithmetic mode.

24. (Currently amended) The motor driving apparatus as defined in Claim 13, further including:

a control unit for setting an operation mode to either a driving mode for driving the linear vibration motor to operate a load that is connected to the linear vibration motor, or an arithmetic mode for calculating the mass/spring ratio;

a temperature detection unit for detecting a temperature of the linear vibration motor;

a mass/spring ratio estimation unit for estimating the mass/spring ratio in a load operating state, wherein:

said control unit temporarily ~~sets~~ is operable to set the operation mode to the arithmetic mode at least one of before a start of the operation of the load and after a completion of the operation of the load;

said mass/spring ratio estimation unit is operable to,

in the arithmetic mode, ~~derives~~ derive a relationship between the temperature of the linear vibration motor and the mass/spring ratio on the basis of the calculated mass/spring ratio and the temperature that is detected by ~~the~~ said temperature detection unit when the mass/spring ratio is calculated, and

in the driving mode, ~~estimates~~ estimate the mass/spring ratio in the load operating state on the basis of the temperature detected by ~~the~~ said temperature detection unit by using the derived relationship between the temperature and the mass/spring ratio; and

said mover position calculation unit ~~calculates~~ is operable to calculate the position of the mover in the driving mode by using the ~~estimated~~ mass/spring ratio estimated by said mass/spring ratio estimation unit.

25. (Currently amended) An air conditioner provided with a compressor which has a cylinder and a piston, and ~~compresses~~ for compressing a liquid in the cylinder by a reciprocating motion of the piston, said air conditioner including:

a linear vibration motor for making the piston reciprocate, said linear vibration motor having a mover which is reciprocatably provided, and a spring member which supports ~~the~~ said mover; and

a motor driving apparatus for driving ~~the~~ said linear vibration motor; ~~and~~  
wherein said motor driving apparatus ~~being~~ is the motor driving apparatus as defined in Claim 1.

26. (Currently amended) A refrigerator provided with a compressor which has a cylinder and a piston, and ~~compresses~~ for compressing a liquid in the cylinder by a reciprocating motion of the piston, said refrigerator including:

a linear vibration motor for making the piston reciprocate, said linear vibration motor having a mover which is reciprocatably provided, and a spring member which supports ~~the~~ said mover; and

a motor driving apparatus for driving ~~the~~ said linear vibration motor;~~;~~ and  
wherein said motor driving apparatus ~~being~~ is the motor driving apparatus as defined in Claim 1.

27. (Currently amended) A cryogenic freezer provided with a compressor which has a cylinder and a piston, and ~~compresses for~~ compressing a liquid in the cylinder by a reciprocating motion of the piston, said cryogenic freezer including:

a linear vibration motor for making the piston reciprocate, said linear vibration motor having a mover which is reciprocatably provided, and a spring member which supports ~~the~~ said mover; and

a motor driving apparatus for driving ~~the~~ said linear vibration motor;~~;~~ and  
wherein said motor driving apparatus ~~being~~ is the motor driving apparatus as defined in Claim 1.

28. (Currently amended) A hot-water supply unit provided with a compressor which has a cylinder and a piston, and ~~compresses for~~ compressing a liquid in the cylinder by a reciprocating motion of the piston, said hot-water supply unit including:

a linear vibration motor for making the piston reciprocate, said linear vibration motor having a mover which is reciprocatably provided, and a spring member which supports ~~the~~ said mover; and

a motor driving apparatus for driving ~~the~~ said linear vibration motor;~~;~~ and  
said motor driving apparatus ~~being~~ is the motor driving apparatus as defined in Claim 1.

29. (Currently amended) A handy phone ~~provided with~~ comprising a linear vibration motor for generating vibration, and a motor driving apparatus for driving ~~the~~ said linear vibration motor, ~~including~~ wherein:

said linear vibration motor ~~having~~has a mover which is reciprocatably provided, and a spring member which supports ~~the said~~ mover; and

said motor driving apparatus ~~being~~is the motor driving apparatus as defined in Claim 1.

30. (Currently amended) The motor driving apparatus as defined in Claim 5, further including: a control unit for setting an operation mode to either a driving mode for driving the linear vibration motor to operate a load that is connected to the linear vibration motor, or an arithmetic mode for calculating the spring constant of the spring member, wherein:

said control unit is operable to temporarily setting-set the operation mode to the arithmetic mode before a start of the operation of the load;

said spring constant calculation unit ~~calculating~~is operable to calculate the spring constant in the arithmetic mode before the start of the operation of the load; and

said mover position calculation unit ~~calculating~~is operable to calculate the position of the mover in the driving mode by using the spring constant that has been calculated before the start of the operation of the load.

31. (Currently amended) The motor driving apparatus as defined in Claim 5, further including: a control unit for setting an operation mode to either a driving mode for driving the linear vibration motor to operate a load that is connected to the linear vibration motor, or an arithmetic mode for calculating the spring constant of the spring member, wherein:

said control unit is operable to temporarily setting-set the operation mode to the arithmetic mode after a completion of the operation of the load;

said spring constant calculation unit ~~calculating~~is operable to calculate the spring constant in the arithmetic mode after the completion of the operation of the load; and

said mover position calculation unit ~~calculating~~is operable to calculate the position of the mover in the driving mode by using the spring constant that has been calculated in a recently set arithmetic mode.

32. (Currently amended) The motor driving apparatus as defined in Claim 5, further including:

a control unit for setting an operation mode to either a driving mode for driving the linear vibration motor to operate a load that is connected to the linear vibration motor, or an arithmetic mode for calculating the spring constant of the spring member;

a temperature detection unit for detecting a temperature of the linear vibration motor; and

a spring constant estimation unit for estimating the spring constant in a load operating state, wherein;

said control unit is operable to temporarily sets-set the operation mode to the arithmetic mode at least one of before a start of the operation of the load and after a completion of the operation of the load;

said spring constant estimation unit is operable to,

in the arithmetic mode, ~~derives-derive~~ a relationship between the temperature of the linear vibration motor and the spring constant on the basis of the calculated spring constant and the temperature that is detected by ~~the-said~~ temperature detection unit when the spring constant is calculated, and

in the driving mode, ~~estimates-estimate~~ the spring constant in the load operating state on the basis of the temperature detected by ~~the-said~~ temperature detection unit by using the derived relationship between the temperature and the spring constant; and

said mover position calculation unit ~~calculates-is operable to calculate~~ the position of the mover in the driving mode by using the ~~estimated-spring constant~~ estimated by said spring constant estimation unit.

33. (Currently amended) The motor driving apparatus as defined in Claim 17, further including: a control unit for setting an operation mode to either a driving mode for driving the linear vibration motor to operate a load that is connected to the linear vibration motor, or an arithmetic mode for calculating the mass/spring ratio, wherein:

said control unit is operable to temporarily setting-set the operation mode to the arithmetic mode before a start of the operation of the load;

said mass/spring ratio decision unit ~~deciding~~ is operable to decide the mass/spring ratio in the arithmetic mode before the start of the operation of the load; and

said mover position calculation unit ~~calculating~~ is operable to calculate the position of the mover in the driving mode by using the mass/spring ratio that has been calculated before the start of the operation of the load.

34. (Currently amended) The motor driving apparatus as defined in Claim 17, further including: a control unit for setting an operation mode to either a driving mode for driving the linear vibration motor to operate a load that is connected to the linear vibration motor, or an arithmetic mode for calculating the mass/spring ratio, wherein:

said control unit is operable to temporarily setting ~~set~~ the operation mode to the arithmetic mode after a completion of the operation of the load;

said mass/spring ratio decision unit ~~deciding~~ is operable to decide the mass/spring ratio in the arithmetic mode after the completion of the operation of the load; and

said mover position calculation unit ~~calculating~~ is operable to calculate the position of the mover in the driving mode by using the mass/spring ratio that has been calculated in a recently set arithmetic mode.

35. (Currently amended) The motor driving apparatus as defined in Claim 17, further including:

a control unit for setting an operation mode to either a driving mode for driving the linear vibration motor to operate a load that is connected to the linear vibration motor, or an arithmetic mode for calculating the mass/spring ratio;

a temperature detection unit for detecting a temperature of the linear vibration motor;

a mass/spring ratio estimation unit for estimating the mass/spring ratio in a load operating state, wherein:

said control unit is operable to temporarily sets ~~set~~ the operation mode to the arithmetic mode at least one of before a start of the operation of the load and after a completion of the operation of the load;

said mass/spring ratio estimation unit is operable to,

in the arithmetic mode, ~~derives~~ derive a relationship between the temperature of the linear vibration motor and the mass/spring ratio on the basis of the calculated mass/spring ratio and the temperature that is detected by ~~the~~ said temperature detection unit when the mass/spring ratio is calculated, and

in the driving mode, ~~estimates~~ estimate the mass/spring ratio in the load operating state on the basis of the temperature detected by ~~the~~ said temperature detection unit by using the derived relationship between the temperature and the mass/spring ratio; and

said mover position calculation unit ~~calculates~~ is operable to calculate the position of the mover in the driving mode by using the estimated mass/spring ratio estimated by said mass/spring ratio estimation unit.

36. (Currently amended) An air conditioner provided with a compressor which has a cylinder and a piston, and ~~compresses~~ for compressing a liquid in the cylinder by a reciprocating motion of the piston, said air conditioner including:

a linear vibration motor for making the piston reciprocate, said linear vibration motor having a mover which is reciprocatably provided, and a spring member which supports ~~the~~ said mover; and

a motor driving apparatus for driving ~~the~~ said linear vibration motor; and  
wherein said motor driving apparatus ~~being~~ is the motor driving apparatus as defined in Claim 5.

37. (Currently amended) An air conditioner provided with a compressor which has a cylinder and a piston, and ~~compresses~~ for compressing a liquid in the cylinder by a reciprocating motion of the piston, said air conditioner including:

a linear vibration motor for making the piston reciprocate, said linear vibration motor having a mover which is reciprocatably provided, and a spring member which supports ~~the~~ said mover; and

a motor driving apparatus for driving ~~the~~ said linear vibration motor; and  
wherein said motor driving apparatus ~~being~~ is the motor driving apparatus as defined in Claim 13.

38. (Currently amended) An air conditioner provided with a compressor which has a cylinder and a piston, and ~~compresses~~ for compressing a liquid in the cylinder by a reciprocating motion of the piston, said air conditioner including:

a linear vibration motor for making the piston reciprocate, said linear vibration motor having a mover which is reciprocatably provided, and a spring member which supports ~~the~~ said mover; and

a motor driving apparatus for driving ~~the~~ said linear vibration motor; ~~and~~  
wherein said motor driving apparatus ~~being~~ is the motor driving apparatus as defined in Claim 17.

39. (Currently amended) A refrigerator provided with a compressor which has a cylinder and a piston, and ~~compresses~~ for compressing a liquid in the cylinder by a reciprocating motion of the piston, said refrigerator including:

a linear vibration motor for making the piston reciprocate, said linear vibration motor having a mover which is reciprocatably provided, and a spring member which supports ~~the~~ said mover; and

a motor driving apparatus for driving ~~the~~ said linear vibration motor; ~~and~~  
wherein said motor driving apparatus ~~being~~ is the motor driving apparatus as defined in Claim 5.

40. (Currently amended) A refrigerator provided with a compressor which has a cylinder and a piston, and ~~compresses~~ for compressing a liquid in the cylinder by a reciprocating motion of the piston, said refrigerator including:

a linear vibration motor for making the piston reciprocate, said linear vibration motor having a mover which is reciprocatably provided, and a spring member which supports ~~the~~ said mover; and

a motor driving apparatus for driving ~~the~~ said linear vibration motor; ~~and~~  
wherein said motor driving apparatus ~~being~~ is the motor driving apparatus as defined in Claim 13.



41. (Currently amended) A refrigerator provided with a compressor which has a cylinder and a piston, and ~~compresses~~for compressing a liquid in the cylinder by a reciprocating motion of the piston, said refrigerator including:

a linear vibration motor for making the piston reciprocate, said linear vibration motor having a mover which is reciprocatably provided, and a spring member which supports ~~the~~said mover; and

a motor driving apparatus for driving ~~the~~said linear vibration motor; ~~and~~  
wherein said motor driving apparatus ~~being~~is the motor driving apparatus as defined in Claim 17.

42. (Currently amended) A cryogenic freezer provided with a compressor which has a cylinder and a piston, and ~~compresses~~for compressing a liquid in the cylinder by a reciprocating motion of the piston, said cryogenic freezer including:

a linear vibration motor for making the piston reciprocate, said linear vibration motor having a mover which is reciprocatably provided, and a spring member which supports ~~the~~said mover; and

a motor driving apparatus for driving ~~the~~said linear vibration motor; ~~and~~  
wherein said motor driving apparatus ~~being~~is the motor driving apparatus as defined in Claim 5.

43. (Currently amended) A cryogenic freezer provided with a compressor which has a cylinder and a piston, and ~~compresses~~for compressing a liquid in the cylinder by a reciprocating motion of the piston, said cryogenic freezer including:

a linear vibration motor for making the piston reciprocate, said linear vibration motor having a mover which is reciprocatably provided, and a spring member which supports ~~the~~said mover; and

a motor driving apparatus for driving ~~the~~said linear vibration motor; ~~and~~  
wherein said motor driving apparatus ~~being~~is the motor driving apparatus as defined in Claim 13.

44. (Currently amended) A cryogenic freezer provided with a compressor which has a cylinder and a piston, and ~~compresses for compressing~~ a liquid in the cylinder by a reciprocating motion of the piston, said cryogenic freezer including:

a linear vibration motor for making the piston reciprocate, said linear vibration motor having a mover which is reciprocatably provided, and a spring member which supports ~~the~~ said mover; and

a motor driving apparatus for driving ~~the~~ said linear vibration motor; ~~and~~  
wherein said motor driving apparatus ~~being~~ is the motor driving apparatus as defined in Claim 17.

45. (Currently amended) A hot-water supply unit provided with a compressor which has a cylinder and a piston, and ~~compresses for compressing~~ a liquid in the cylinder by a reciprocating motion of the piston, said hot-water supply unit including:

a linear vibration motor for making the piston reciprocate, said linear vibration motor having a mover which is reciprocatably provided, and a spring member which supports ~~the~~ said mover; and

a motor driving apparatus for driving ~~the~~ said linear vibration motor; ~~and~~  
wherein said motor driving apparatus ~~being~~ is the motor driving apparatus as defined in Claim 5.

46. (Currently amended) A hot-water supply unit provided with a compressor which has a cylinder and a piston, and ~~compresses for compressing~~ a liquid in the cylinder by a reciprocating motion of the piston, said hot-water supply unit including:

a linear vibration motor for making the piston reciprocate, said linear vibration motor having a mover which is reciprocatably provided, and a spring member which supports ~~the~~ said mover; and

a motor driving apparatus for driving ~~the~~ said linear vibration motor; ~~and~~  
wherein said motor driving apparatus ~~being~~ is the motor driving apparatus as defined in Claim 13.

47. (Currently amended) A hot-water supply unit provided with a compressor which has a cylinder and a piston, and ~~compresses for~~ compressing a liquid in the cylinder by a reciprocating motion of the piston, said hot-water supply unit including:

a linear vibration motor for making the piston reciprocate, said linear vibration motor having a mover which is reciprocatably provided, and a spring member which supports ~~the~~ said mover; and

a motor driving apparatus for driving ~~the~~ said linear vibration motor; ~~and~~

wherein said motor driving apparatus ~~being~~ is the motor driving apparatus as defined in Claim 17.

48. (Currently amended) A handy phone ~~provided with~~ comprising a linear vibration motor for generating vibration, and a motor driving apparatus for driving ~~the~~ said linear vibration motor, including wherein:

said linear vibration motor ~~having~~ has a mover which is reciprocatably provided, and a spring member which supports ~~the~~ said mover; and

said motor driving apparatus ~~being~~ is the motor driving apparatus as defined in Claim 5.

49. (Currently amended) A handy phone ~~provided with~~ comprising a linear vibration motor for generating vibration, and a motor driving apparatus for driving ~~the~~ said linear vibration motor, including wherein:

said linear vibration motor ~~having~~ has a mover which is reciprocatably provided, and a spring member which supports the mover; and

said motor driving apparatus ~~being~~ is the motor driving apparatus as defined in Claim 13.

50. (Currently amended) A handy phone ~~provided with~~ comprising a linear vibration motor for generating vibration, and a motor driving apparatus for driving ~~the~~ said linear vibration motor, including wherein:

said linear vibration motor ~~having~~ has a mover which is reciprocatably provided, and a spring member which supports ~~the~~ said mover; and

| said motor driving apparatus ~~being~~ is the motor driving apparatus as defined in  
Claim 17.